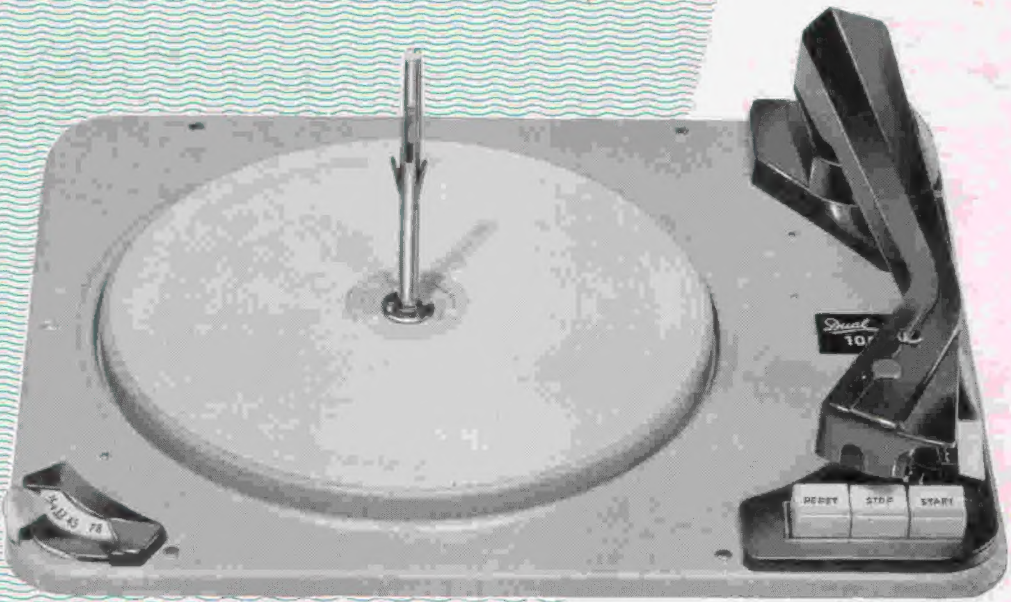
1006

Service Manual



Record Changer 1006

GEBRÜDER STEIDINGER · ST. GEORGEN / BLACK FOREST

dualcan

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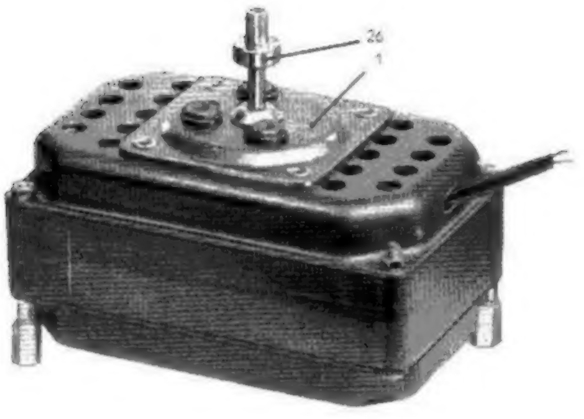
1. Technical data

Input Voltage:	110 / 220 V AC
Frequency:	50 or 60 cps
Power Consumption:	app. 13 watts
Drive:	4-pole induction motor with low external field
Speeds:	78, 45, 33 and 16 rpm
Tonearm:	Will accept all cartridges having standard US mounting dimensions; also available with DUAL Wide Range Crystal Cartridge CDS 420 / 4
Weight:	11.3 lbs (5.1kg)

2. Function of the individual parts

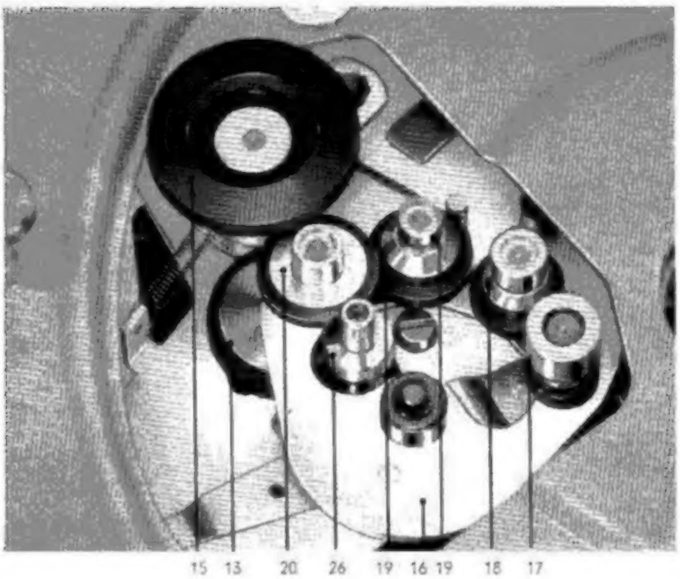


Motor

Motor

Both the turntable and the other drive components are driven by a 4-pole induction motor (1) having an extremely low external magnetic field and vibration-free operation.

The speed of the motor is constant within 10% of the nominal line voltage. Deviation is dependent upon and proportional to the line frequency. Matching the motor to a 50 or 60 cps line is accomplished by use of different motor pulleys (26). Motor pulleys for 50 or 60 cycles can be supplied by the factory. For the installation and removal of these motor pulleys, a special tool (pull-off Tool KDW 101) can be supplied by the factory. If changing the motor pulley becomes necessary great care must be exercised to prevent bending of the motor shaft. Failure to do this may cause rumble and flutter.



Friction Wheel Drive

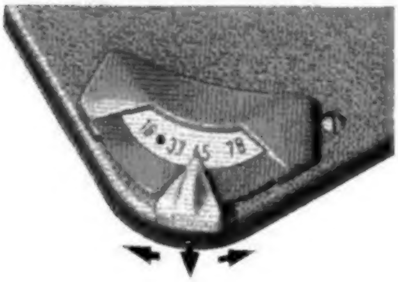
Turntable Drive

Turntable speeds of 16, 33, 45, and 78 rpm are accomplished by the selection of the proper friction drive (16) which reduces the speed of the motor.

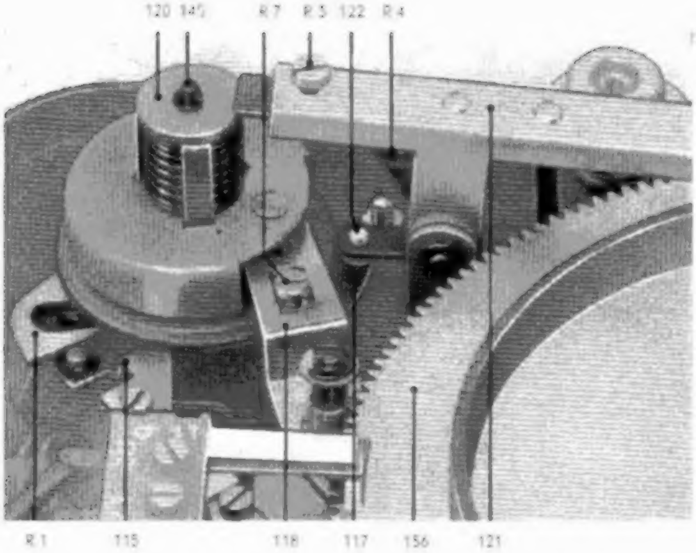
Drive of the turntable (87) is made by means of a drive wheel (idler) (15). To prevent damage to the rubber covering of the drive wheels the entire drive mechanism is automatically disengaged when the record changer is inoperative. A high degree of freedom from rumble is further achieved by grinding the rubber coverings concentrically with the wheel bearings. Keep lubricants away from all parts of the friction drive mechanism.

For transportation purposes all intermediate drive wheels (17—20) should be disengaged. For this purpose a "neutral" position is provided on the speed selector switch.

Equal change cycle duration regardless of turntable speed is accomplished through the use of the cycle drive wheel (13) and its inward movement relative to the turning of the cam wheel (156). The intermediate wheels (17—20) are disconnected during this interval.



Speed Selector



Mechanism for Tonearm Control

Control of Tonearm

The movements of the tonearm for lowering and raising are effected by cams on both sides of the cam wheel (156) when rotated through 360 degrees. The control elements consist mainly of the lifter (lift arm) and the lift rod (145) for the lifting action, and the cam lever (118) for horizontal movement of the arm.

Exception to the above is the movement of the arm, once it is dropped onto the record and the backward or outward movement to find the starting groove. These functions are accomplished by a slight angle on the position of the pick-up rollers.

Note:

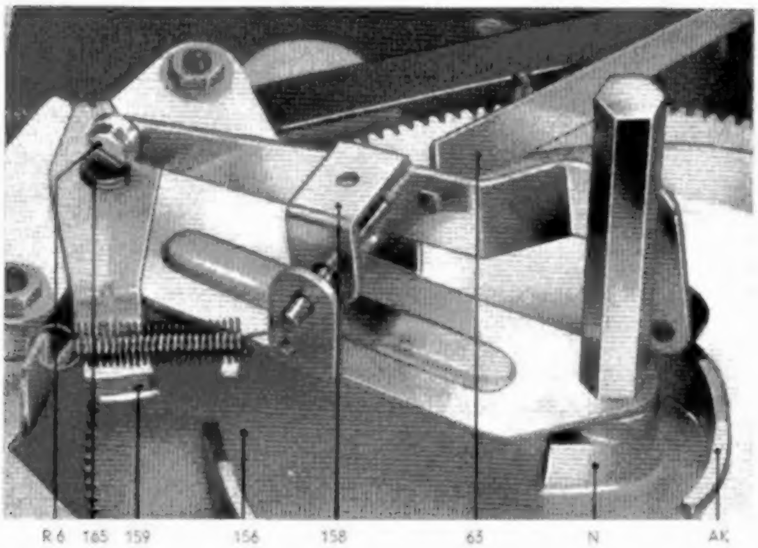
For proper servicing be sure turntable is level.

Record Drop

Two spindles are provided for stacking and dropping of records. For standard records (small center hole), changer spindle (172) is provided while for 45 rpm records a special drop spindle AS 6 (175) is available.

The dropping process is triggered (set off) by a revolution of the cam wheel (156) whose cam (AK) trips the ROCKER ARM (158) and the changer rod (165). The lift of the changer rod (165) then causes a record to drop either from the changer spindle or the 45-spindle.

The drop cam (AK) on the rim of the wheel (165) is so arranged that a record can only be dropped when the arm is in the right-hand position, that is beyond the outside diameter of a 12-inch record.



Mechanism for Record Drop

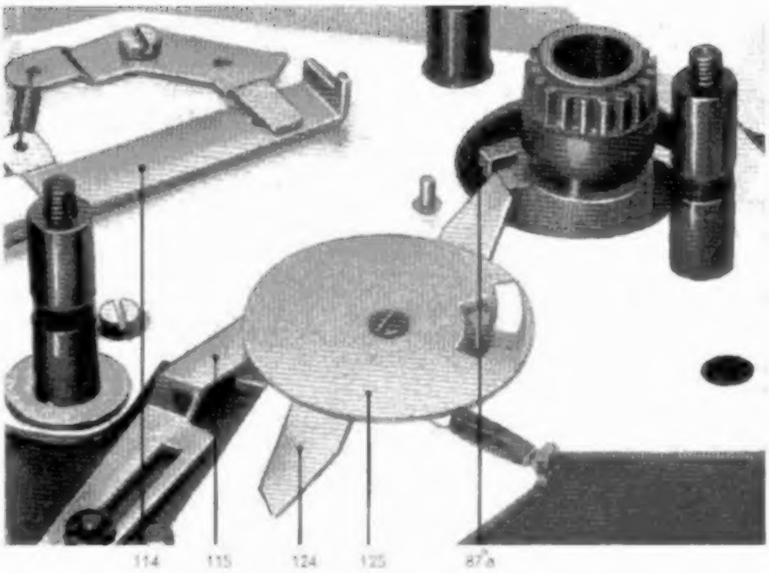
Shut-off

The start of the changing cycle after playing a record, and the final switch-off action after the last record of a stack has been played, are effected by the catch (dog) of the turntable pinion (87 a) and the shut-off pawl (124).

The shut-off pawl will move during the playing cycle, with the aid of the draw link (115) and will approach the catch on the turntable pinion.

Because of its angle, the shut-off pawl (124) will be held off by the catch (87 a) as long as the advance is only one groove wide.

Only the end-spiral with its greater feed causes the shut-off pawl to swing out and closer to the catch with each revolution. The pawl is now caught by the catch and pulled through. This movement is transmitted through the friction disk (125) to the cam wheel (156) which is taken out of its rest position and brought into mesh with the pinion of the turntable.



Shut-off Device
(cam wheel removed)

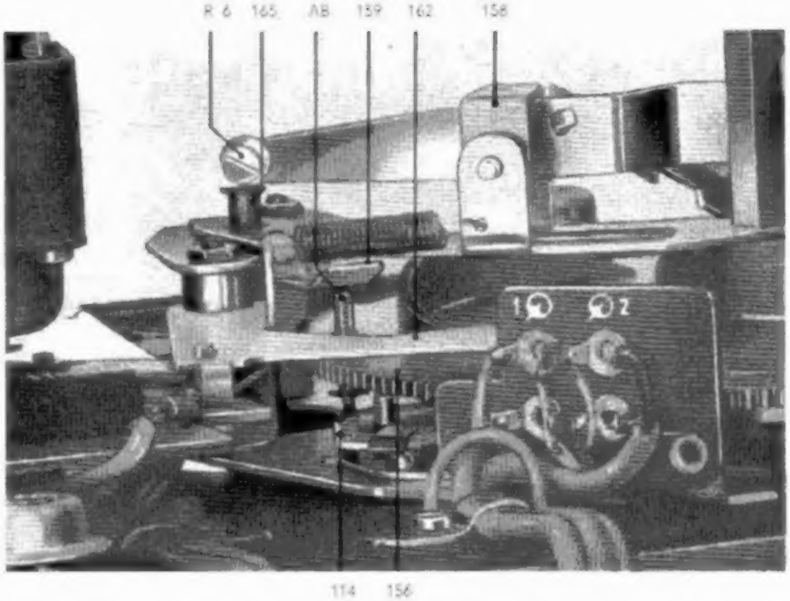
a) Final Shut-off

b) Stop-Key

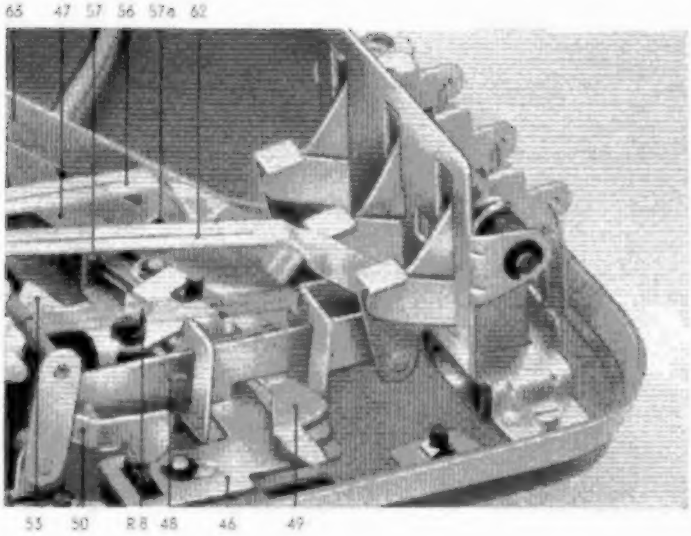
a) After the last record has been dropped, the feeler bar (159) causes the lift rod (AB) to move vertically when the cam wheel is rotated. The lift rod touches the angle stop (114) and thereby alters the position of the cam follower (118) which is then switched over to the second part of the cam.

   Through this operation the arm will move to its rest position, and thereby cause power shut-off as well as disengagement of the drive wheels.

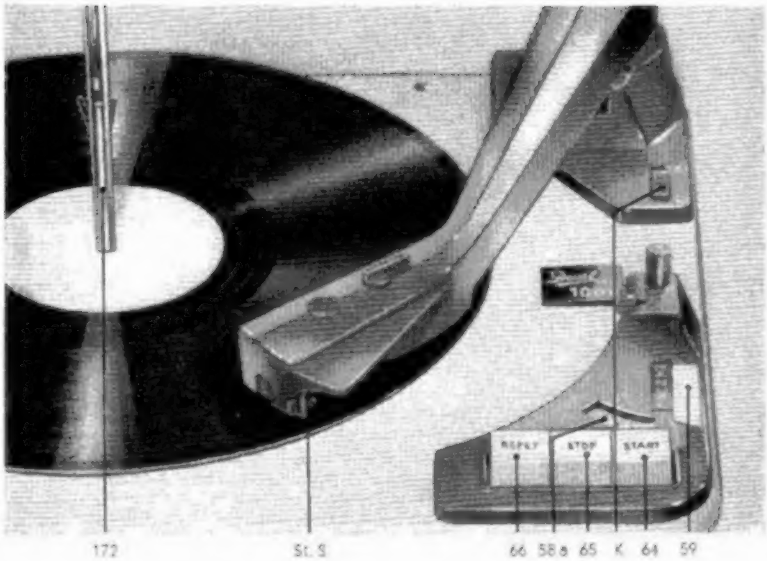
b) The same effect, as mentioned under a) above is also caused by depressing the "STOP"-key (65). This causes the stop bar (56) to engage the angle stop (114) which in turn forces switching of the cam lever (118) and thereby provides shut-off of the mechanism.



Functional Switch Mechanism



Push-Button Control with Power Switch



Operating Elements

Start

Operation of the "Start"-key results in three simultaneous functions.

a) Movement of the start bar (62), the start-link (116) and the start-angle (130) causes the cam wheel (156) to move out of its rest position and thereby mesh with the turntable pinion (87 a).

b) The slider (48) changes the position of the cut-off lever (50) and operates power switch (53).

c) The slider (48) moves the engagement lever (49), lift bar (47) and lifter (14) at the same time, thereby engagement of the idler wheel (15) and the turntable (87) take place.

All of the above functions result in proper record drop and automatic lowering of the arm.

Manual Operation

In this method of operation it is possible to move the arm to any desired spot on a record — actuating the "Manual"-key (59) will then start the record without any delay.

A second method of manual operation of the arm consists of depressing the "Manual"-key (59) then moving the arm by hand onto the rotating record. (Note: Turntable will rotate only after arm has been lifted from its rest.)

Repeating

This operation can be achieved by pressing down the "REPET"-key (66) which causes the repeat bar (63) to move the dropping lever (158) out of reach of the cam (AK) which is part of the cam wheel (156). Return of the dropping lever (158) is done through the cam (N) located on the shaft of the wheel (156) after the tone arm engages the record and the cam (156) finishes its cycle.

Stereo-Key

The lever switch (K) is to be placed into the applicable position (◯◯ for Stereo Records) or (O for monaural records). This device serves to control the stereo effect and to provide an improvement of monaural reproduction by placing the two channels in paralell when the switch is in the "O" position.

Automatic Lowering of Arm onto Record

This process will take place in the following sequence:

a) Arm lifts — Record drops and arm moves towards spindle, then sits down on rotating record on outer pick-up roller.

b) Because of the angle at which the roller is mounted the arm will be moved by the turning records towards the outer edge of the record until the outer roller has dropped off the surface of the record and the inner roller contacts the record.

c) The inner roller then moves the arm inward just far enough so that the outer roller touches the edge of the record, thereby indexing the record.

d) Once more the arm is lifted up and the pick-up rollers recede into the pick-up arm housing.

e) Finally the arm is lowered and the stylus engages the record grooves.

Tracking pressure of Arm (Stylus tracking pressure)

The built-in scale (58a) permits a check on the tracking pressure of the stylus.

When the arm is placed on the balance, the dial will read the tracking pressure in grams at the stylus point.

This feature is especially helpful because the pick-up heads can be fitted with different cartridges whose weight may not be the same. In order to obtain accurate readings the arm should be tapped lightly.

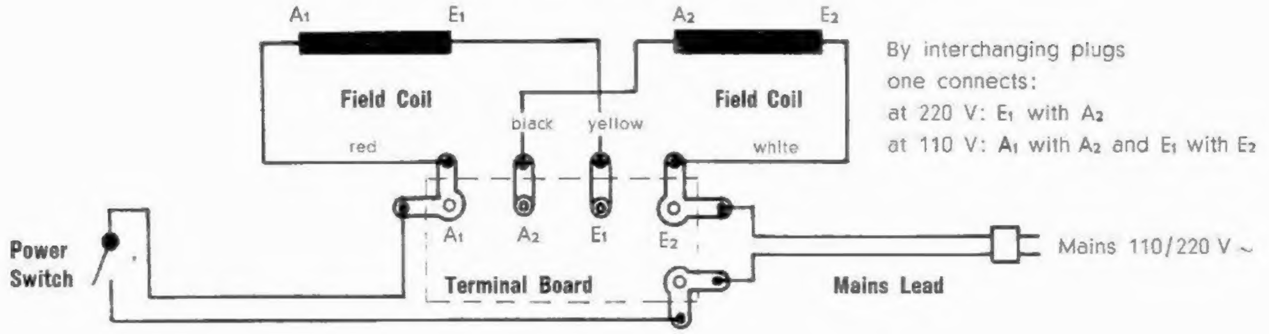
Adjustment of the tracking pressure is made by the knurled screw located on the front of the arm base. The adjustment of tracking pressure down to a value of $1^{1}/_{2}$ grams will have no effect on operation of the record changer if this value still lies within the capabilities of the particular pick-up cartridge.

3. Adjustments

Arm Position over Rest	Adjust Stop (R 1) after loosening hex nut. Arm must sit on the base so that the rest is positioned between the two ridges on the underside of the tonearm.
Arm Height Control	Adjust eccentric disc (R 2) at back of pick-up arm base. Adjustment is correct when the ridges on the underside of the pick-up arm clear the arm rest by .060 inch, as arm moves towards center turntable.
Dropping Position of Arm	Adjust eccentric screw (R 7) of Cam Lever (118). a) Adjustment is correct, when after the second lowering of the arm, the stylus touches the record .060" ($^{1}/_{16}$th inch) inward from the rim. b) An additional means of adjustment for the arm drop position is the set screw (St. S) located on the right side of the cartridge holder. This screw adjusts the position of the outer roller.
Lift of Drawbar (In Arm) for Roll Pick-up	Adjust screw (R 3) on lift arm (121). a) Adjustment is correct when the lift arm (121) through the first cam, has caused the cap of the release (120) to raise between .008" and .012" above the retaining clip. b) Additional adjustment of the lift consists of changing the length of the drawbar through screw and eccentric adjustment. However, these are accessible only after removal of the arm from its base.
Brake Adjustment	Use eccentric screw (R 4) on Liftarm (121). Setting is correct when there is a space (gap) of approx. .008" to .012" between the brake peg (122) and clutch (117) while the cam wheel (156) is in zero position.
Lift of Changer Rod for record drop	Use eccentric screw (R 6) on dropping lever (158). Adjustment is correct when records drop reliably without any pressure while the changer rod is in its highest position.
Tripping point of Shut-off	Adjust eccentric screw (R 5) on Draw member (115). The shut-off lever (124) must touch the follower (87 a) when the pick-up stylus, during the play cycle, has reached a record diameter of 5.20 inches.
Rest position of Lift Bar	Adjust eccentric adjustment (R 8) of intermediate lever (46). Position is correct when, after return of the arm to its rest, the lift rail (47) can move freely past angles (57 and 57 a).

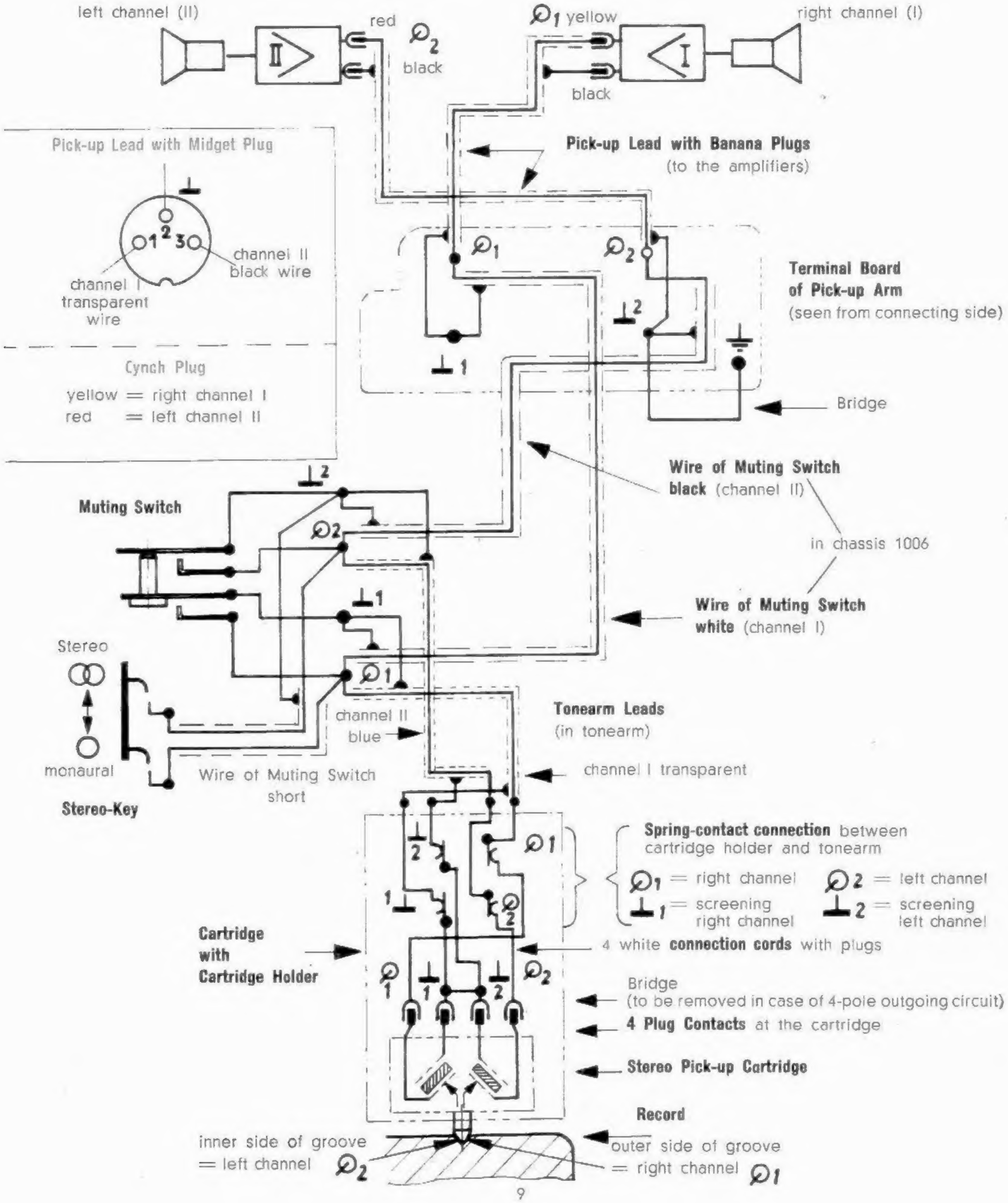
For reference numbers mentioned in this guide, which cannot be found in the illustrations, please refer to the Spare Parts List for Model 1006.

4. Wiring Diagram — Motor Side



By interchanging plugs
one connects:
at 220 V: E1 with A2
at 110 V: A1 with A2 and E1 with E2

Wiring Diagram — Pick-up Side


left channel (II)
red
black
yellow
right channel (I)
black
Pick-up Lead with Banana Plugs
(to the amplifiers)
Pick-up Lead with Midget Plug
1
2
3
channel II black wire
channel I transparent wire
Cynch Plug
yellow = right channel I
red = left channel II
Terminal Board of Pick-up Arm
(seen from connecting side)
1
2
Bridge
Muting Switch
Wire of Muting Switch black (channel II)
in chassis 1006
Wire of Muting Switch white (channel I)
Stereo
monaural
Stereo-Key
channel II blue
Wire of Muting Switch short
Tonearm Leads
(in tonearm)
channel I transparent
Spring-contact connection between cartridge holder and tonearm
1 = right channel
2 = left channel
1 = screening right channel
2 = screening left channel
Cartridge with Cartridge Holder
4 white connection cords with plugs
Bridge
(to be removed in case of 4-pole outgoing circuit)
4 Plug Contacts at the cartridge
Stereo Pick-up Cartridge
Record
inner side of groove = left channel
outer side of groove = right channel

5. Notes

a) Records

Design of the Record Changer is based on the standardized dimensions of phonograph records. The following tolerances are to be noted:

a) Record thickness .079" ± .015"

b) Center holes

12" record } .283" + .0035"
10" record }
7" record 1.50" + .002"

Equally important is the groove pattern. Flawless operation of the changer can be assured when both lead-in and eccentric grooves are located at the proper diameters, and when the stopping groove has the proper pitch. (Inaccurately made records will cause irregular performance of the automatic shut-off for example).

b) Turntable

To further increase the speed accuracy, the following "heavy" turntable is available:

Model 15 / 1006 weighing 3.3 lbs.

c) Pick-up

Aside from the DUAL wide range crystal pick-up Model CDS 420 / 4, Model 1006 Record Changer can be supplied with blank cartridge holders. These will accept all American cartridges having standard mounting dimensions.

d) Changer Spindle

Due to its special construction, no stabilizer arms are required on the Model 1006 Changer. Record drop will be flawless (even with unbalanced weight load), when the center holes of the records are within the above stated limits. It is important that the changer spindle be turned clockwise, after insertion, until a stop is reached.

e) 45 Changer Spindle AS 6

Stacks of records with 1.5" diameter center hole will be dropped accurately. It is recommended to remove the hole reducers which are often supplied with 7-inch records. Faulty drop operation can usually be attributed to worn center holes. (Label left-overs must be removed).

f) Pick-up Cable

If it becomes necessary to increase the length of the pick-up leads (up to 25 feet), only a special replacement cable, available from the authorized distributor should be used. So-called extension cables, available elsewhere are in most instances unsatisfactory.

g) Muting Switch

A 2-channel muting switch is incorporated in the changer. It eliminates noises during the change cycle while the pick-up is lowered and raised. The muting switch opens the pick-up lines only during play or when the unit is at rest

h) Lubrication

The Changer has been lubricated at the factory. This should be adequate for a long period (up to 2 years, depending on use).

Lubrication, and lubricants shall be in accordance with lubrication chart 1006.

Flawless operation of the changer can only be assured when lubricants recommended by the factory are used.

Important

Turntable should never be removed or replaced unless unit is in zero position !

(Cam-pin with Compression Spring (F 10) engaged in notch of latch segment (162).)

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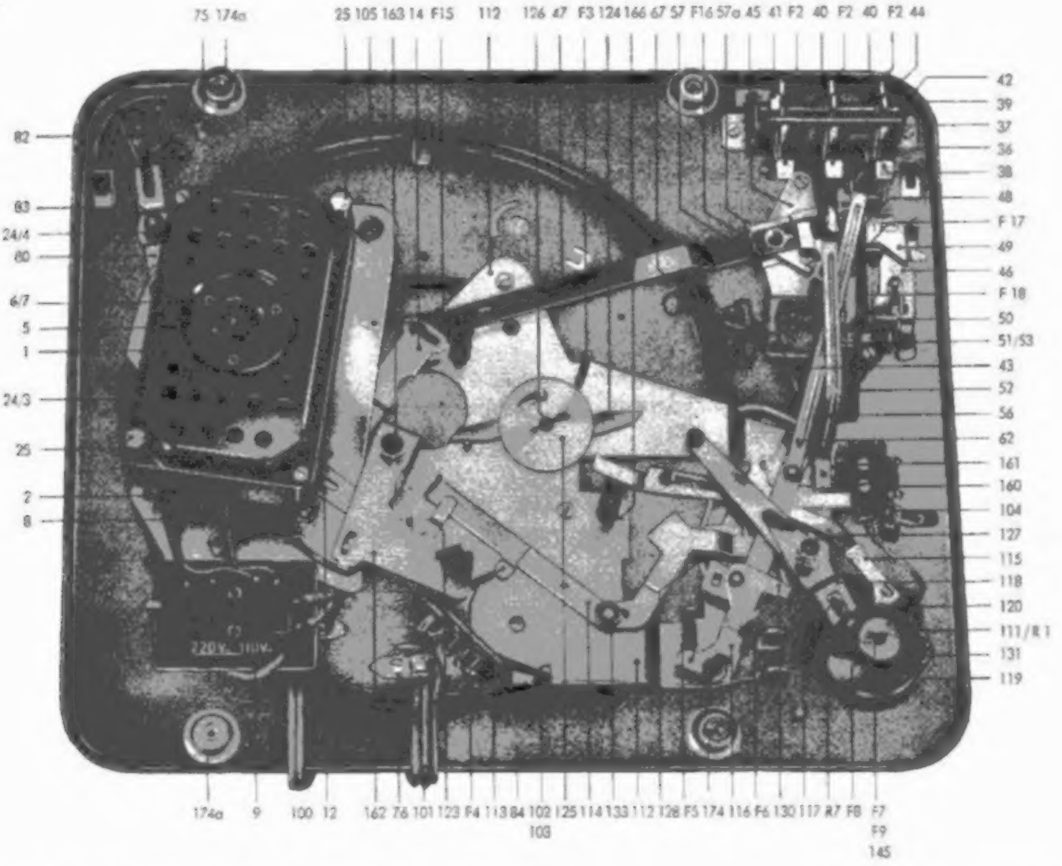
Spare parts list for Dual Record Changer 1006



Spare Parts for DUAL Record Changer 1006

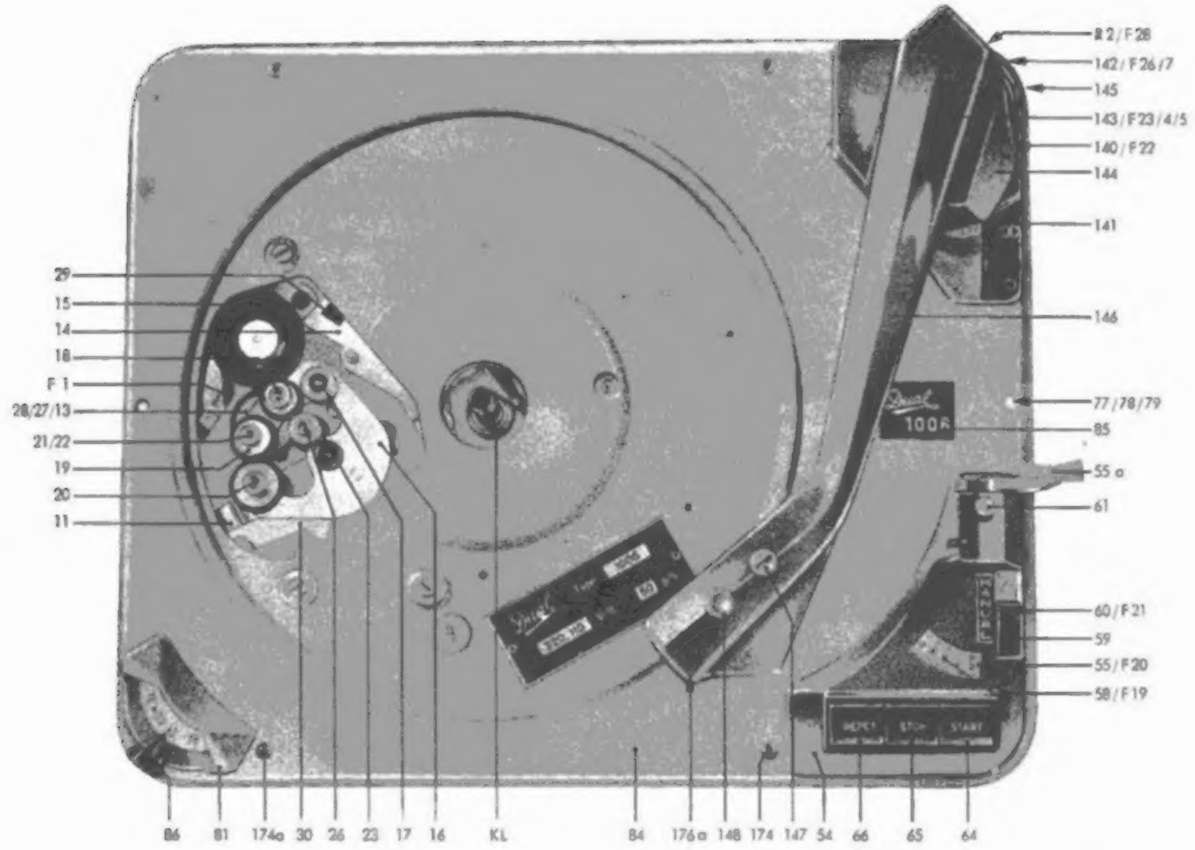
Type 12 C - Model A

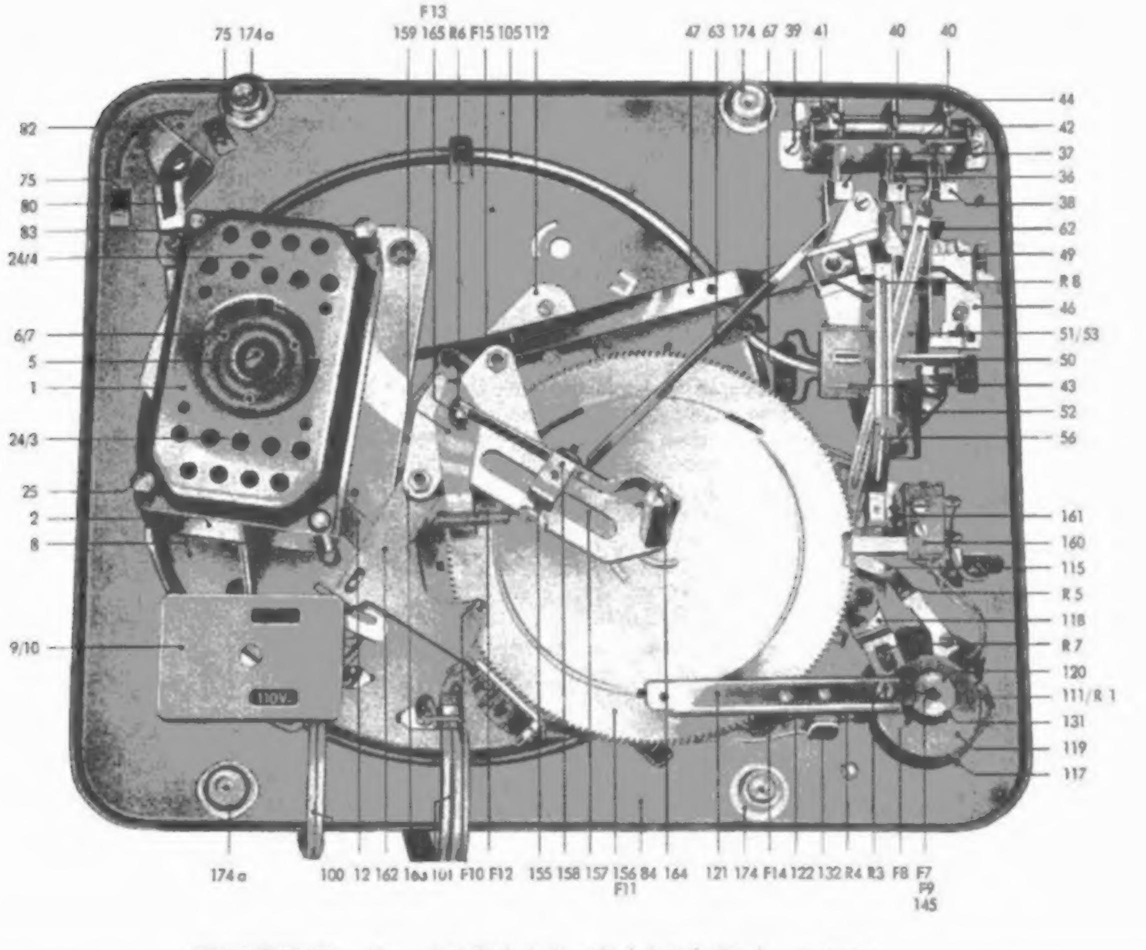
Location	Order No.	Description	No. Required per unit	Can. List
				3
	31 E - Mod. A	Motor complete with Drive	1	31.98
1	31 E - U 2	Motor complete without drive	1	21.12
2	31 E - U 4	Stator with Field Coils	1	13.74
3	31 E - U 16	Field Coil, left	1	2.82
4	31 E - U 18	Field Coil, right	1	2.82
5	31 E - U 31	Rotor	1	4.02
6	31 E - U 40	Bearing, lower, compl.	1	1.44
7	31 E - U 44	Bearing, upper, compl.	1	2.58
8	31 E - U 52	Motor Mount w. AC terminal bd.	1	2.28
9	31 E - U 56	Contact Plate, compl.	1	0.90
10	31 E - U 58	Connector Plate	1	0.60
11	31 E - U 60	Lever	1	0.30
12	31 E - U 62	Constant speed bar	1	0.30
13	31 E - U 65	Constant speed wheel	1	0.72
14	31 E - U 66	Idler Lift Lever	1	0.36
15	31 E - U 71	Pivot Arm with idler	1	1.86
16	31 E - U 80	Yoke, compl.	1	1.14
17	31 E - U 84	78 rpm drive wheel	1	1.38
18	12 B - U 44	45 rpm drive wheel	1	1.38
19	12 B - U 46	33 rpm drive wheel	1	1.38
20	31 E - U 87	16 rpm drive wheel	1	1.38
21	11 C - 138	washer, drive wheel	4	0.06
22	12 B - 86	"C" washer, drive wheel	4	0.06
23	31 F - 78	Cover disk	1	0.06
24	31 E - 24	Pin, Polepiece	4	0.06
25	31 E - 56	Post	2	0.12
26	31 E - 64	Drive Pulley for 50 cycles	1	0.24
	31 E - 76	Drive Pulley for 60 cycles	1	0.24

Spare Parts Dual 1006 GH-248

Location	Order No.	Description	No. Required per unit	CAN.LIST
27	31 E - 116	Distance Bush	1	0.24
28	31 E - 124	Set screw, const. speed wheel	1	0.12
29	31 E - 160	Stop	1	0.06
30	31 G - 74	Push Lever (Shift lever)	1	0.06
		Keys and Line Switch		
36	12 B - U 86	Stop Lever	1	0.30
37	12 B - U 88	Repeat Lever	1	0.24
38	12 C - U 154	Start Lever	1	0.36
39	12 B - 110	Bracket, bearing; large	1	0.36
40	12 B - 112	Slide I	2	0.12
41	12 B - 114	Slide II	1	0.12
42	12 B - 130	Shaft	1	0.06
43	12 B - 176	Protective Cover	1	0.18
44	12 C - U 150	Key Assembly, complete	1	5.70
45	12 C - U 162	Bearing Bracket, small	1	0.60
46	12 C - U 166	Link, complete	1	0.36
47	12 C - U 172	Lift Rail	1	0.30
48	12 C - U 176	Push, complete	1	0.12
49	12 C - U 178	Engagement lever, compl.	1	0.18
50	12 C - U 180	Switching bracket, compl.	1	0.18
51	12 C - U 184	Mercury Switch, complete	1	3.42
52	12 C - U 185	Rocker Take-up	1	0.84
53	12 C - U 186	Rocker, complete	1	2.28
54	12 C - U 190	Escutcheon, complete	1	3.12
55	12 C - U 194	Scale link	1	0.24
55a	12 C - U 196	Tonearm lock, complete	1	0.20
56	12 C - U 200	Stop Rail, complete	1	0.36
57	12 C - 318	Guide	1	0.06
57a	12 C - 320	Guide angle, stamped	1	0.06
58	12 C - 394	Weight Scale	1	0.30
59	12 C - 412	Manual Key	1	0.12
60	12 C - 414	Spring for Manual key	1	0.12
61	12 C - 418	Tonearm Rest	1	0.18
62	12 C - 424	Start Rail	1	0.18
63	12 C - 436	Repeat Rail	1	0.18
64	12 C - 500	Start Button	1	0.24
65	12 C - 502	Stop Button	1	0.24
66	12 C - 504	Repeat Button	1	0.24
67	4020 / 65	Condenser	1	0.60
		Base, Turntable, etc.		
75	12 A - 92	Speed Nut	7	0.06
76	12 A - 325	Cable Clamp	2	0.06
77	12 A - 412	Inserts, threaded		0.06
78	LS 4 / 38 b	Oval Head Screws 1. Transport	2	0.06
79	4,2/10/0,5 PS	Washers		
80	12 B - U 24	Switch Link, complete	1	0.30
81	12 B - U 26	Switch Escutcheon, compl.	1	0.84
82	12 B - U 28	Switch Lever, complete	1	0.18
83	12 B - 40	Threaded Stud	1	0.06
84	12 C - U 2	Main Plate, complete	1	13.74
85	12 C - 15	DUAL emblem	1	0.36
86	12 C - 22	Switch Pointer	1	0.12
87	12 C - U 137	Turntable, compl. (Standard)	1	5.70
89	12 C - 286	Rubber Mat for Turntable	1	1.56
91	12 C - 290	Cover Disc for Turntable	1	0.18
92	4650 / 9a	Clip (E-washer)	1	0.06
		Cable		
100	12 D - U 140	Power Cord	1	1.74
101	12 C - U 128	Pick-up Cable	1	4.32
102	12 C - 256	Muting Switch Cable, black (KII)	1	0.72
103	12 C - 258	Muting Switch Cable; white (KI)	1	0.72
104	12 C - 270	Muting Switch Cable, short	1	0.72
105	12 C - 264	Switch Cable	1	0.24
		Arm Drive		
111	11 A - 195	Stop	1	0.12
112	12 C - U 16	Upper Deck Plate, complete	1	3.18
113	12 C - U 23	Pick-up Terminal Board, compl.	1	0.36
114	12 C - U 32	Stop Bracket, compl.	1	0.60
115	12 C - U 42	Draw-Link compl. w. Set Rail	1	0.36
116	12 C - U 48	Start-Link, compl.	1	0.24

Location	Order No.	Description	No. Required per unit	CAN. LIST
117	12C-U 74	Clutch disc, complete	1	0.84
118	12C-U 80	Cam Lever, complete	1	0.72
119	12C-U 86	Clutch Plate, compl.	1	0.60
120	12C-U 90	Release Tube	1	0.36
121	12C-U 112	Lifting Lever, compl.	1	0.60
122	12C-U 116	Brake Lever, compl.	1	0.18
123	12C- 46	Holder, for stop lever	1	0.06
124	12C- 49	Shut-off pawl	1	0.18
125	12C- 50	Friction plate	1	0.36
126	12C- 52	Set Screw for Friction Plate	1	0.06
127	12C- 64	Threaded stud for Cam Lever	1	0.06
128	12C- 72	Ratchet Lever	1	0.06
130	12C- 102	Start Lever	1	0.06
131	12C- 172	Spring Housing	1	0.06
132	12C- 236	Lifting Lever Shaft	1	0.06
133	4,2/10/0,3	Washer	1	0.06
140	15E-U 20	Tone Arm Base compl. w. lever for units up to No. 27650	1	1.74
	15E-U 30	Tone Arm Base compl. w. lever for units from No. 27651	1	1.74
141	15E-U 16	Cover Plate for Tone Arm Base	1	1.14
142	15E-U 22	Bearing Plate w. Bracket for units up to No. 27650	1	1.74
	15E-U 43	Bearing Plate w. Bracket for units from No. 27651	1	1.74
143	15E-U 23	Control piece for Drawbar	1	1.74
144	15E- 40	Tone Arm Base Housing	1	0.60
145	15E-U 44	Lift Rod, compl.	1	0.30
146	15E-U 46	Tone Arm, complete for units up to No. 27650	1	8.58
	15E-U 54	Tone Arm, complete for units from No. 27651	1	8.58
147	15E- 153	Slotted straining bolt	1	0.25
148	12C- 440	Lock cap	1	0.12
155	12A- 119	Shaft for Rocker Arm	1	0.12
156	12C-U 94	Cam Wheel	1	7.44
157	12C-U 99	Lower Deck, compl.	1	1.74
158	12C-U 106	Drop Bracket	1	0.48
159	12C-U 110	Feeler Lever, compl.	1	0.30
160	12C-U 124	Contact Set for muting switch	1	0.34
161	12C- 44	Muting Switch Bracket	1	0.12
162	12C- 200	Latch Segment	1	0.24
163	12C- 202	Bushing	1	0.06
164	12C- 204	Post, long	1	0.18
165	12C-U 114	Changer Bolt	1	0.12
166	8,1/15/1 Fb	Washer	1	0.06
F 1	31E- 148	Tension Spring for Drive Wheel	1	0.06
F 2	12B- 135	Tension Spring for Pushbutton plungers	3	0.12
F 3	12C- 54	Tension Spring for friction plate	1	0.12
F 4	12C- 66	Tension Spring for Stop Bracket	1	0.12
F 5	12C- 100	Tension Spring for Start Link	1	0.06
F 6	12C- 104	Tension Spring for Start Lever	1	0.12
F 7	12C- 164	Compression Spring for Clutch	1	0.12
F 8	12C- 170	Compression Spring for Clutch plate	1	0.06
F 9	12C- 174	Compression Spring for Lift Rod	1	0.12
F 10	12C- 192	Compression Spring for Cam Wheel	1	0.12
F 11	12C- 196	Leaf Spring for Cam Wheel	1	0.06
F 12	12C- 214	Tension Spring for Engaging lever	1	0.12
F 13	12C- 224	Compression Spring for Changer bolt	1	0.12
F 14	12C- 234	Tension Spring for Brake Lever	1	0.12
F 15	12C- 342	Tension Spring for Lift Rail	1	0.12
F 16	12C- 344	Tension Spring for Rest Bar	1	0.12
F 17	12C- 354	Tension Spring for Pusher	1	0.12
F 18	12C- 374	Tension Spring for Shutoff lever	1	0.12
F 19	12C- 400	Tension Spring for Scale Link	1	0.12
F 20	12C- 408	Tension Spring for Pointer	1	0.12
F 21	12C- 416	Tension Spring for Spring Disc	1	0.12
F 22	15E- 18	Tension Spring for Arm Base Plate	1	0.06
F 23	15E- 56	Compression Spring for Release Rail	1	0.12
F 24	15E- 60	Tension Spring for Release Rail	1	0.12
F 25	15E- 66	Tension Spring for Arm Pusher	1	0.12
F 26	15E- 90	Counterbalance Spring, external	1	0.06
F 27	15E- 92	Counterbalance Spring, internal	1	0.06
F 28	15E- 88	Tension Spring for Bearing Bracket	1	0.12


R 2 / F 28
142 / F 26 / 7
145
143 / F 23 / 4 / 5
140 / F 22
144
141
146
77 / 78 / 79
85
55 a
61
60 / F 21
59
55 / F 20
58 / F 19
29
15
14
18
F 1
28/27/13
21/22
19
20
11
86
81
174a
30
26
23
17
16
KL
84
176a
148
174
147
54
66
65
64
Dual
1006
REJECT
STOP
START
MANUAL


75
174a
F13
159
165
R6
F15
105
112
47
63
174
67
39
41
40
40
44
42
37
36
38
62
49
R 8
46
51/53
50
43
52
56
161
160
115
R 5
118
R 7
120
111/R 1
131
119
117
82
75
80
83
24/4
6/7
5
1
24/3
25
2
8
9/10
110V
174a
100
12
162
163
101
F10
F12
155
158
157
156
F11
84
164
121
174
F14
122
132
R4
R3
F8
F7
F9
145